EXHIBIT A

2006 Fish Passage Implementation Plan
March 31, 2006

Background:

The 2006 Fish Passage Implementation Plan describes the Corps' plan for fish passage operations at its Federal Columbia River Power System (FCRPS) dams during the 2006 fish migration season. This plan is consistent with the 2004 Biological Opinion adaptive management strategy as discussed in the Second Declaration of Colonel Gregg F. Martin and the Fourth Declaration of Rock Peters (collectively "2004 Biological Opinion"), and the Opinion and Order issued by Judge Redden dated December 29, 2005, denying in part and granting part Plaintiffs' motion for preliminary injunctive relief in *NWF v. NMFS* ("Order"). In its Order, the Court largely denied Plaintiffs' motion for preliminary injunction with two limited exceptions: (1) the Court ordered the Corps to spill at Lower Granite and Lower Monument from April 20 – May 30, 2006, and at Little Goose from May 26-30, 2006, consistent with the 2004 Biological Opinion; and, (2) the Court ordered the Corps to continue its summer spill operations from August 15-31, 2006, consistent with the 2004 Biological Opinion. In accordance with the Court's Order, the Corps has modified its fish passage operations to address these two changes. Water Management operations not addressed in the Order will continue to be consistent with the operations considered in the 2004 Biological Opinion and in particular, the 2006 Water Management Plan. The following is a comprehensive description of the fish passage operations for the 2006 migration season.

SPRING SPILL OPERATIONS

Lower Snake River: the Corps will provide spill from April 3, 2006, through June 20, 2006 at the Lower Granite, Little Goose, Lower Monumental, and Ice Harbor dams.

Lower Columbia River: the Corps will provide spill from April 10, 2006 through June 30, 2006 at the McNary, John Day, The Dalles and Bonneville dams.

The following table summarizes spring spill operations planned for each mainstem dam. The "spill cap" refers to the maximum flow a project can spill that does not exceed state total dissolved gas (TDG) levels for fish passage. Spill caps may vary daily depending on flow and other environmental conditions.

Project	**Corps' Planned 2006 Spring Operations April 3 – June 20 Snake River April 10 – June 30 Columbia River (Day/Night)**
Lower Granite	**20kcfs / 20kcfs**
Little Goose	**30%/30%**
Lower Monumental	**40kcfs / 40kcfs**

Ice Harbor	**30%/30% vs 45kcfs/Spill Cap (Through July 21)**
McNary	**40%/40% vs 0 / 150kcfs (Through June 20) 0 / 150kcfs (June 21-30)**
John Day	**0 / 60%**
The Dalles	**40% / 40%**
Bonneville	**100kcfs/100kcfs**

SUMMER SPILL OPERATIONS

Lower Snake River: the Corps will provide spill from June 21, 2006, through August 31, 2006 at the Lower Granite, Little Goose, Lower Monumental, and Ice Harbor dams.

Lower Columbia River: the Corps will provide spill from July 1, 2006 through August 31, 2006 at the McNary, John Day, The Dalles and Bonneville dams.

The following table summarizes summer spill operations planned for each mainstem dam. Spill cap refers to the maximum flow a project can spill that does not exceed state total dissolved gas (TDG) levels for fish passage. Spill caps may vary daily depending on flow and other environmental conditions.

Project	**Corps' Planned 2006 Summer Operations June 21 – Aug 31 Snake River July 1 – Aug 31 Columbia River (Day/Night)**
Lower Granite	**18 kcfs / 18 kcfs**
Little Goose	**30% / 30%**
Lower Monumental	**17 kcfs / 17 kcfs**
Ice Harbor	**30%/30% vs. 45kcfs/Spill Cap (Through July 21) 45kcfs/Spill Cap (July 22 to August 31)**
McNary	**40%/40% vs. 60%/60%**
John Day	**30% / 30%**
The Dalles	**40% / 40%**
Bonneville	**75kcfs / 120kcfs**

General Guidance for 2006 Fish Passage Operations

The Corps' proposed 2006 fish passage operations that were submitted to the Court in November 2005 assumed "average" run-off conditions. However, actual run-off conditions may be higher

or lower requiring adjustments to avoid or minimize poor juvenile or adult fish passage conditions or powerhouse constraints. Therefore, actual spill volumes may vary from the tables above. In addition, spill volumes may require adjustments for the following reasons:

- Total dissolved gas (TDG) is managed daily in response to changing conditions. Adjustments will be made to manage the spill operation consistent with the Oregon and Washington state TDG limits for fish passage.
- Power system and other project emergencies may necessitate temporary adjustments in accordance with established protocols.

The following describes the processes for spill management during high and low runoff conditions, TDG management, specific spring and summer operations for fish passage for each mainstem project, juvenile transportation program operations, protocols for emergencies, and monthly reporting to the Court.

Spill Management

The Corps will initiate spill at 0001 hours, or shortly after midnight, at each of the projects on the start dates specified in the tables above. Spill caps will be established at the specified amounts and will continue unless conditions require changing to maintain TDG within the limits established by the States of Oregon and Washington: 115% in the forebay and 120% in the tailwater of a dam. The Corps will terminate spill at 2359 hours, or shortly before midnight, at each project on the specified end dates in the tables above.

The spill volumes represented in the tables above assume average runoff conditions, however, actual conditions may require adjustments to these spill levels. Volumes may increase above the specified spill levels for two reasons: (1) high runoff conditions where flows exceed the powerhouse hydraulic capacity with the specified spill levels; and, (2) a lack of power load resulting in an increase in the volume of spill.

Spill below the specified levels could occur during low runoff conditions when meeting minimum generation levels at a project requires reducing spill volumes. This would most likely occur in late July and August. Minimum generation levels and spill levels are included below in the project specific information.

To make adjustments in response to changes in conditions, the Corps will utilize the existing Regional Forum committees. The Technical Management Team (TMT) may recommend changes in spill volumes when conditions are higher or lower than anticipated with average runoff conditions, which the Corps may decide to implement. This would include potential issues and adjustments to the juvenile transportation program. Spill patterns and biological test issues that have not been coordinated to date will be coordinated through the Corps' Anadromous Fish Evaluation Program (AFEP) subcommittees, which include the Studies Review Work Group (SRWG), the Fish Facility Design Review Workgroup (FFDRWG), and the Fish Passage and Operations and Maintenance group (FPOM).

Total Dissolved Gas Management

In order to manage spill cap volumes consistent with the States of Oregon and Washington's TDG limits for fish passage, the Corps' Reservoir Control Center (RCC) establishes the total volumes of spill (spill caps) for each project on the lower Columbia and Snake rivers on a daily basis throughout the fish passage season. These spill caps are set so that resultant TDG saturation levels are not expected to exceed the states' TDG caps of 120% in the tailwater of each dam, and 115% in the forebay of the next dam downstream, as measured as a high 12-hour average each day. Within any given day, some hours of measured TDG levels may be higher or lower than these gas caps due to changing environmental conditions (wind, air temperature, etc). The process of establishing daily spill caps entails reviewing existing hourly data at each dam (including flow, spill, temperature, and TDG levels) and taking into consideration a number of forecast conditions (including total flow, flow through the powerhouse, wind and temperature forecast, etc.). This information is used as input into the SYSTDG modeling tool. The SYSTDG model estimates TDG levels in the rivers several days into the future and is a tool integral to daily decision-making when establishing spill caps at individual dams.

SYSTDG output is used to guide decisions to establish spill caps at each dam that will not cause exceedance of the states' TDG caps. However, during the spring freshet when flows are expected to be greater than hydraulic capacity with the specified spill levels at the dams, the Corps will attempt to minimize TDG on a system-wide basis. In this case, spill caps are also developed for 125%, 130%, or 135% to minimize TDG throughout the system.

Operations to manage TDG will continue to be coordinated through the TMT.

Biological Spring and Summer Operations for Fish Passage by Project

The following describes the spring and summer operations by project. Included in the description is planned research as considered in the 2004 Biological Opinion. The Corps, and the regional agencies and Tribes are interested in the continuation of project research studies under the Corps' AFEP. These studies have undergone review by the regional agencies and Tribes and are consistent with the spill levels provided to the Court. The studies are intended to provide further information on project survival and assist the region in making decisions on future operations and configuration actions to improve fish passage at the Lower Snake and Columbia River dams.

Lower Granite

Spring Spill Operations April 3 – June 20, 2006: 20 kcfs (including approximately 6 kcfs from the RSW and 14 kcfs from the training spill) 24 hour/day with the Removable Spillway Weir (RSW) operating.

Changes in Operations for Research Purposes:

- Spill duration for testing: Approximately April 15 through May 31. The dates of testing will be dependent on the size of fish, fish availability, and the number of treatments needed for testing. Final dates for testing will be coordinated through the SRWG.

- Spring research operations: Normal spring spill patterns as described in the Fish Passage Plan (FPP) with Behavioral Guidance Structure (BGS) IN place and BGS OUT as two treatments. There is no specific request for spill variations for testing.

- Objectives of the biological test: The focus of the spring research is to determine the effects of BGS on horizontal fish distribution and passage and to determine survival through the project, spillway, and RSW.

- Spill pattern during the biological test: The spill pattern for testing is provided in attachment 1 (Table, LWG-9).

Operation considerations:

  - Unit 2 will be out of service for the spring and summer test periods.
  - With Unit 2 out of service, powerhouse capacity is about 108 kcfs. If total river discharge is greater than approximately 128 kcfs, then spillway discharge will be forced above spill caps. This involuntary spill could cause exceedances of the states' gas TDG caps. Lack of power load could also cause involuntary spill at higher total river discharges.
  - Spill pattern change for research equipment installation: Installation of equipment for hydroacoustic research is planned for April 3 between 06:30 and 17:00. The work schedule may require adjustment in the event of unforeseen problems (potentially between April 3 and April 12.) This installation will occur in spillbay 1 with the RSW and turbine unit 6, requiring spillbays 1-4 to be closed for that time period to allow for diving operations. The spill level of 20kcfs spill will therefore occur through bays 5-8 in a bulked pattern during the hours of installation activity (not to exceed 18 daylight hours).
  - On April 6 and 7, pole-mounted transducers are scheduled to be installed in Lower Granite spillbays 2 – 8. The installation of these transducers requires closing the spillbay while the poles are being placed in the water. While a spillbay is closed, another spillbay would be opened an appropriate number of stops to insure that the spill volume is not changed during these installations. The installation will take approximately 1 – 2 hours at each spillbay. The work schedule may require adjustment in the event of unforeseen problems (potentially between April 3 and April 12).

Once the operations for research are completed, the spill pattern will return to RSW plus training spill for a total 20 kcfs spill as described in the FPP. This should be the same as during the test. BGS will be moved to OUT or stored position following the spring test.

Summer Spill Operations June 21 – August 31, 2006: 18 kcfs 24 hours/day with the RSW operating plus training spill

Changes in Operations for Research Purposes:

- Spill duration for testing (timing): Approximately June 20 - July 21. The dates of testing will be dependent on the size of fish, fish availability, and the number of treatments needed for testing. Final dates for testing will be coordinated through the SRWG.

- Summer research operations: There will be two treatments for the summer test. Both treatments will use the RSW plus two different patterns of training spill. Both treatments will spill approximately 18 kcfs.

- Objectives of the biological test: The purpose of the summer test will be to determine the effectiveness of RSW vs. different patterns of training spill to evaluate survival of subyearling fall Chinook.

- Spill pattern during biological test: Spill patterns are provided in attachment 1 (Tables, LWG-9 and LWG-11).

Operation considerations:

  - The BGS will be in the OUT (stored) position during the summer test.
  - Unit 2 will be Out of Service.
  - Minimum spill: During periods of low flow before the spring freshet and during the summer period, there may be periods where spill quantities are so low that tailrace conditions are created that are not advantageous to fish passage. If such low runoff conditions occur, the TMT will consider alternative spill operations at the dam.
  - Minimum generation: 11.5 kcfs will be maintained for system reliability. This limit may be met in early spring before the freshet and during the late summer period when there are low flow conditions.

Once the operations for research are completed, spill patterns will return to summer spill normal operations as described in the FPP and to the levels shown in the tables above.

Little Goose

Spring Spill Operations April 3 – June 20, 2006: 30% spill 24 hours/day.

Changes in Operations for Research Purposes:

- Spill duration for testing: April 15 –May 30. The dates of testing will be dependent on the size of fish, fish availability, and the number of treatments needed for testing. Final dates for testing will be coordinated through the SRWG.

- Spring research operations: 30% spill 24 hour/day. However, two spill patterns will be alternated.

- Objectives of the biological test: The primary objectives of the spring test will be to determine route specific survival estimates, approach paths, passage distribution, forebay residence time, and tailrace egress under two alternating spill patterns.

- Spill pattern during the biological test: Spill patterns are provided in attachment 1 (Tables, LGS-10 and LGS-11).

Operation considerations:

  - Because there has never been daytime voluntary spill in the spring, adult passage or other issues could arise requiring further regional coordination and adaptive management.
  - The powerhouse capacity is approximately 117 kcfs. If total river discharge is greater than approximately 167 kcfs, then spillway discharge will be forced above the planned operation of 30% spill.
  - Spill pattern change for research equipment installation: Installation of equipment for hydroacoustic research in turbine units 5 and 6 is planned for April 13 between 06:30 and 17:00. This work schedule may require adjustment (potentially between April 10 and April 14) in the event of unforeseen problems. During this time, the scheduled 30% spill volume would be passed through spillbays 5 – 8. This work will not entail a reduction of spill volume and the total time that spill would be reconfigured (approximately 11 hours) would not likely change.

Once the operations for research are completed, spill patterns will return to normal operation as described in the FPP and to the levels as shown in the tables above.

Summer Spill Operations June 21 – August 31, 2006: 30% spill 24 hours/day.

Changes in Operations for Research Purposes:

- Spill duration for testing: Approximately June 30 – end of July. The dates of testing will be dependent on the size of fish, fish availability, and the number of treatments needed for testing. Final dates for testing will be coordinated through the SRWG.

- Summer research operations: 30% spill 24 hour/day. However, two spill patterns will be alternated similar to spring.

- Objectives of the biological test: The summer test will determine route specific survival estimates, approach paths, passage distribution, forebay residence time, and tailrace egress for subyearling fall Chinook.

- Spill pattern during the biological test: Spill patterns are provided in attachment 1 (Tables, LGS-10 and LGS-11).

Operation considerations:

  - In the summer period of 2005, adult passage was blocked when daytime spill levels were above 30%. Therefore, it is possible that as flow recedes in summer of 2006, the summer spill patterns and treatments may need to be changed through the adaptive management process so that good adult passage is maintained.
  - Minimum spill: During periods of low flow before the spring freshet and during the late summer period, there may be periods where spill quantities are so low that it creates tailrace conditions not advantageous to fish passage. If such flow conditions occur, the TMT will consider alternative operations at the dam.
  - Minimum generation: 11.5 kcfs will be maintained for system reliability. This limit may be met in early spring before the freshet and during the late summer period when there are low flow conditions.

Once the operations for research are completed, the spill patterns will return to normal operation as described in the FPP and to the spill levels as shown in the tables above.

Lower Monumental

Spring Spill Operations April 3 – June 20, 2006: 40 kcfs spill 24 hour/day. The spill cap is expected to keep spill within a range of 27 - 35 kcfs, perhaps as low as 27 kcfs when using a bulk spill pattern.

Changes in Operations for Research Purposes:

- Spill duration for testing: April 25 –May 30. The dates of testing will be dependent on the size of fish, fish availability, and the number of treatments needed for testing. Final dates for testing will be coordinated through the SRWG.

- Spring research operations: Two spill patterns will be used depending on total river flow. A bulk spill pattern will be evaluated at river flows less than 120kcfs simulating an RSW operation. For river flow in excess of 120kcfs, a uniform spill pattern will be used.

- Objectives of the biological test: The primary objective is to provide a relative survival estimate for fish using Radio Tags (RT) that travel volitionally through the project. This will provide a second year of survival and passage data for yearling Chinook and a first year of data for steelhead. Only a single treatment test is currently planned due to a tag manufacturing limitation and the need to undertake RT work during the summer with fall Chinook.

- Spill pattern during the biological test: The spill patterns that will be evaluated are provided in attachment 1 (Tables, LMN-13 and LMN-14).

Operation considerations:

  - The spill cap will keep spill within a range of 27 - 35 kcfs, and as low as 27 kcfs when using a bulk spill pattern.
  - Additionally, the Lower Monumental spill cap is affected by LGS operations and therefore spill discharge could be even lower.
  - Operating units within 1% peak efficiency yields up to 19 kcfs per unit at each of the 6 units for a maximum hydraulic capacity of approximately 114 kcfs. The expected gas spill cap is 27 - 35 kcfs. Therefore, if total river discharge is greater than 149 kcfs the TDG cap will be exceeded. The lack of power load can also cause forced spill above spill cap levels at higher total river discharges.

Once the operations for research are completed, the spill patterns will return to normal operation as described in the FPP and to the spill levels as shown in the tables above.

Summer Spill Operations June 21 – August 31 2006: 17 kcfs spill 24 hours/day

Changes in Operations for Research Purposes:

- Spill duration for testing: June 21 – August 31 (entire summer spill period). The dates of testing will be dependent on the size of fish, fish availability, and the number of treatments needed for testing. Final dates for testing will be coordinated through the SRWG.

- Summer research operations: 17 kcfs spill 24 hours/day

- Objectives of the biological test: Monitor fall Chinook movement with RT to provide a relative survival estimate. Additionally, there will be an acoustic

telemetry study to characterize the relationship between fish movement, mortality, and hydrodynamic conditions in the reservoir during summer months. Findings are intended to facilitate development of the experimental design for a RSW Post Construction Survival Evaluation study in 2007.

- Spill pattern during the biological test: Spill patterns are provided in attachment 1 (Table, LMN-11).

Operation considerations:

- Spill cap may be affected by Little Goose operations.
- Minimum spill: During periods of low flow before the spring freshet and during the summer period, there may be periods when spill quantities are so low that tailrace conditions are not advantageous to fish passage. If such a low flow condition occurs, the TMT will consider alternative operations at the dam.
- Minimum generation: 11.5 kcfs will be maintained for system reliability. This limit may be met in early spring before the freshet and during the late summer period when there are low flow conditions.

Operations for research will continue throughout summer spill period.

Ice Harbor

Spring Spill Operations April 3 – June 20, 2006: 45 kcfs day/spill cap night.

Changes in Operations for Research Purposes:

- Spill duration for testing (timing): Approximately April 20 – June 10. The dates of testing will be dependent on the size of fish, fish availability, and the number of treatments needed for testing. Final dates for testing will be coordinated through the SRWG.

- Spring research operations: 30% spill 24 hours/day vs. 45 kcfs day/spill cap night. Both treatments will have the RSW operating.

- Objectives of the biological test: Determine the passage rates and survival of fish during 30% spill and 45 kcfs/spill cap operations for yearling Chinook and steelhead.

- Spill pattern during the biological test: Spill patterns are provided in attachment 1 (Tables, IHR-10 and IHR-11).

Operation considerations:

Powerhouse capacity at Ice Harbor is approximately 94 kcfs which in combination with spill cap levels of about 100 kcfs. If total river flows exceed about 194 kcfs, we would anticipate TDG levels to exceed the limits set by the states of Oregon and Washington.

Operations for research will continue through entire spring period.

Summer Spill Operations June 21 – August 31 2006: 45 kcfs day/spill cap night with the RSW operating.

Changes in Operations for Research Purposes:

- Spill duration for testing: Approximately June 11 – July 10. The dates of testing will be dependent on the size of fish, fish availability, and the number of treatments needed for testing. Final dates for testing will be coordinated through the SRWG.

- Summer research operations: 30% spill 24 hours/day vs. 45 kcfs day/spill cap night. Both treatments will have the RSW operating.

- Objectives of the biological test: Determine the passage distribution and route specific survival through all passage routes for subyearling fall Chinook.

- Spill pattern during the biological test: Spill patterns are provided in attachment 1 (Tables, IHR-10 and IHR-11, same as spring).

Operation considerations:

  - Minimum spill: During periods of low flow before the spring freshet and during the summer period, there may be periods where spill quantities are so low that tailrace conditions are not advantageous to fish passage. The minimum spill for Ice Harbor Dam is 15.2 kcfs, which includes providing spill through the RSW and training spill to ensure good tailrace egress conditions. If such a low flow condition occurs, the TMT will consider alternative operations at the dam.
  - Minimum generation: 9.5 kcfs will be maintained for system reliability. This limit may be met in early spring before the freshet and during the late summer period when there are low flow conditions.

Once research spill operations are completed, the plan is to use the spill pattern in the FPP with the RSW operating and the levels shown in the tables above, but the spill pattern will be reconsidered through physical modeling and discussions with the SRWG and FFDRWG.

McNary

Spring Spill Operations April 10 – June 30, 2006: 0 kcfs day/150 kcfs (spill cap) night.

Changes in Operations for Research Purposes:

- Spill duration for testing: April 20 – June 3 (tentative). The dates of testing will be dependent on the size of fish, fish availability, and the number of treatments needed for testing. Final dates for testing will be coordinated through the SRWG.

- Spring research operations: 40% spill 24 hours/day vs. 0 kcfs day/150 kcfs (spill cap) night.

- Objectives of the biological test:

    - Estimate passage and survival rates of yearling Chinook salmon under two treatments of project operations.
    - Estimate passage and survival rates of juvenile steelhead under two treatments of project operations.
    - Characterize juvenile salmon behavior in the forebay of McNary Dam under two treatments of project operations.

- Spill pattern: As outlined in the FPP. Spill pattern changes to facilitate steelhead passage during the daytime are pending. The Corps' Walla Walla District will continue coordination with regional fishery managers and will evaluate new spill patterns with general model observations in the March/April timeframe.

Operation considerations:

- If total river discharge exceeds approximately 170 kcfs, involuntary spill will occur during the daytime while implementing the 0 day/spill cap nighttime treatment. If river discharge forecasts are levels exceeding 170 kcfs, it may be necessary to drop or alter this treatment for testing. This is being discussed in the FFDRWG with a decision being made prior to the initiation of the evaluation.
- During the periods when total river discharge exceeds approximately 320 kcfs, involuntary spill in excess of the states' TDG limits for fish passage, may be necessary.
- In addition, low power demand may also necessitate involuntary spill during 12-hour treatment at total river discharges of less than 320 kcfs.

Once research spill operations are completed, the spill patterns will return to normal operation as described in the FPP and to the spill levels as shown in the tables above.

Summer Spill Operations July 1 – August 31, 2006: 40% spill vs. 60% spill 24 hours/day. Spill conditions will be alternated every two days.

Changes in Operations for Research Purposes:

- Spill duration for testing: June 20 - July 22 (tentative). The dates of testing will be dependent on the size of fish, fish availability, and the number of treatments needed for testing. Final dates for testing will be coordinated through the SRWG.

- Summer research operations: 40% spill 24 hours/day vs. 60% spill 24 hours/day. The spill will be alternated in two day blocks which will be randomized during testing.

- Objectives of the biological test:

    - Estimate passage and survival rates of subyearling fall Chinook salmon under two treatments of project operations.
    - Characterize juvenile salmon behavior in the forebay of McNary Dam under two treatments of project operations.

- Spill pattern during the biological test: Use pattern outlined in the FPP.

Operation considerations:

- Minimum powerhouse flow of 50 kcfs is required. If total river discharge drops below 85 kcfs, 40% spill treatment may be reduced to maintain 50 kcfs powerhouse discharge. Similarly, if total river discharge drops below 125 kcfs, the 60% spill treatment may be reduced to maintain a 50 kcfs powerhouse discharge.
- Minimum spill: During periods of low flow before the spring freshet and during the summer period, there may be periods where spill quantities are so low that tailrace conditions are not advantageous to fish passage. If such a low flow condition occurs, the TMT will consider alternative operations at the dam.

Once research spill operations are completed, the spill patterns will return to normal operation as described in the FPP and to the spill levels as shown in the tables above.

John Day

Spring Spill Operations April 10 – June 30, 2006: 0 kcfs spill day/60% spill night.

Changes in Operations for Research Purposes:

- Spill duration for testing (timing): Approximately April 26 through June 7. The dates of testing will be dependent on the size of fish, fish availability, and the number of treatments needed for testing. Final dates for testing will be coordinated through the SRWG.

- Spring research operations: There is no research planned for 2006 that requires specific spill operations. There will be an evaluation of survival and passage conditions at Main Unit 9. A balloon-tag test will occur from about 15 March to 7 April, prior to spill.

- Objectives of the biological test:

    - Estimate the direct effects of turbine passage on yearling chinook injury and survival at three turbine operations: lower limit of 1% efficiency, peak efficiency, and upper limit of 1% efficiency.
    - Characterize the turbine passage environment with autonomous sensors; and,
    - Estimate the total survival of yearling Chinook that pass through turbine unit 9.

- Spill pattern during the biological test: as outlined in the FPP. Research will not change spill patterns or levels.

Operation considerations:

- The hydraulic capacity for John Day is approximately 325 kcfs with 16 units in operation. However, the T-1 transformer recently failed which limits operation of main units 1 – 4. This limits the hydraulic capacity through turbines to approximately 246 kcfs. Currently, the outage duration is unknown but is projected to be until September. If total river discharge exceeds 246 kcfs, involuntary spill will occur during the daytime. Regional discussions through FPOM are occurring to assess whether further operational actions are warranted.
- If total river flow exceeds approximately 400 kcfs at night, 60% night spill levels would be 160 kcfs which may exceed TDG levels.

Summer Spill Operations July 1 – August 31 2006: 30% spill 24 hours/day.

Changes in Operations for Research Purposes:

- Spill duration for testing: June 20 – July 20. The dates of testing will be dependent on the size of fish, fish availability, and the number of treatments needed for testing. Final dates for testing will be coordinated through the SRWG.

- Summer research operations: 30% spill 24 hours/day. The Corps plans to continue the 30% day/30% night operation in 2006 and pursue further collaborative discussions with the regional agencies and Tribes on configuration alternatives for future implementation.

- Objectives of the biological test: Subyearling Chinook salmon will be released in the tailrace of JDA to estimate survival and detection probabilities below JDA for calculation of sample sizes for future survival studies using acoustic technology.

- Spill pattern during the biological test: No special operations required. Spill patterns described in the FPP will be used. Research will not change spill patterns or levels.

Operation considerations:

  - Minimum spill: During periods of low flow before the spring freshet and during the summer period, there may be periods where spill quantities are so low that tailrace conditions are not advantageous to fish passage. If such a low flow condition occurs, the TMT will consider alternative operations at the dam.
  - Minimum generation: 50 kcfs is needed. If river flows drop below about 71 kcfs then spill may need to drop below 30% spill in order to maintain station service needs.

The Dalles

Spring Spill Operations April 10 – June 30, 2006: 40% spill 24 hours/day.

Changes in Operations for Research Purposes:

- Spill duration for testing (timing): April 11 – June 7. The dates of testing will be dependent on the size of fish, fish availability, and the number of treatments needed for testing. Final dates for testing will be coordinated through the SRWG.

- Spring research operations: No special operation requested.

- Objectives of the biological test:

    - Determine the direct effects of passage through spillbay 6 with and without a vortex suppression device on juvenile yearling Chinook survival and injury;
    - Estimate survival and detection probability of acoustic-tagged fish released below The Dalles Dam;
    - Determine the horizontal distribution of fish passing through the spillway; and
    - Evaluate radio-tagged fish behavior and total survival following passage through the spillway.

- Spill pattern during the biological test: as outlined in the FPP. Research will not change spill patterns or levels.

Operation considerations:

- Spillway wire ropes at The Dalles Dam are being replaced on Bays 1-9 in 2006. The schedule for this replacement is shown in the table below. By the start of the spill-for-fish season, spillbays 1-6 will be fully operational. By May 15, work at bays 7-9 will be completed and the gates will be operational. Bays 10, 11, and 13 will not be repaired in 2006 and will not be available for use due to unsafe wire ropes. Bays 12 and 14-22 will be operable in 2006.
- When high river flows exceed those shown in the table below such that available bays 1 – 9 cannot maintain 40% spill, FPOM and TMT will discuss the preferred spill pattern and volume. The project may maintain 40% spill of the total river flow and depart from the spill pattern, or spill less than 40% of the total river flow using a pattern other than that shown in the FPP. At no time is spill recommend on the south side of the spillway (Bays 14-22) as this creates a poor tailrace egress condition for spillway-passed fish.

Spill Bays	**Date Available**	**Highest total river Q where spillway can meet 40%**
1-6	10 April	315
1-7	20 April	360
1-8	30 April	405
1-9	15 May	450

- There will be two turbine units out of service for most of the 2006 spill season which include: Unit 12 will be out from April 3, through June 1; and Unit 13 will be out from May 15 through September 14, 2006.

Summer Spill Operations July 1 – August 31, 2006: 40% spill 24 hours/day

Changes in Operations for Research Purposes:

- Spill duration for testing (timing): Approximately June 7 – July 20. The dates of testing will be dependent on the size of fish, fish availability, and the number of treatments needed for testing. Final dates for testing will be coordinated through the SRWG.

- Summer research operations: No special operation requested.

- Objectives of the biological test:

    - Estimate survival and detection probability of acoustic-tagged fish released below The Dalles Dam; and
    - Determine the horizontal distribution of fish passing through the spillway.

- Spill pattern during the biological test: as outlined in the FPP. Research will not change spill patterns or levels.

Operation considerations:

- When high river flows exceed those shown in the table above such that available bays 1 – 9 cannot maintain 40% spill, FPOM and TMT will discuss the preferred spill pattern and volume. The project may maintain 40% spill of the total river flow and depart from the spill pattern, or spill less than 40% of the total river flow using a pattern other than that shown in the FPP. At no time is spill recommend on the south side of the spillway (Bays 14-22) as this creates a poor tailrace egress condition for spillway-passed fish.
- Minimum generation: 50 kcfs is needed. If river flows drop below about 90 kcfs then spill may need to drop below 40% spill in order to maintain station service needs.

Bonneville

Spring Spill Operations April 10 – June 30, 2006: 100 kcfs spill 24 hours/day.

Changes in Operations for Research Purposes:

- Spill duration for testing: April 26 – June 7. The dates of testing will be dependent on the size of fish, fish availability, and the number of treatments needed for testing. Final dates for testing will be coordinated through the SRWG.

- Spring research operations: 100 kcfs spill 24 hours/day.

- Objectives of the biological test: Estimate total survival of yearling Chinook passing through the dam and spillway.

- Spill pattern during the biological test: Fish passage spill patterns are provided in attachment 1 (Table, Bonn-1). For spill levels exceeding 100 kcfs, spill patterns described in the FPP will be used. Research will not change spill patterns or levels.

Operation considerations:

  - At spring flows less than 135 kcfs, spill will be less than 100 kcfs to maintain minimum powerhouse generation of 30 kcfs plus fish ladder and facility spill (e.g. corner collector).
  - Currently units 2, 10, 11, and 12 are out of service. Without these units operating, the current capacity is about 258 kcfs. Unit 2 is expected to return to service in mid March adding about 10 kcfs, (268), unit 12 will be back in early April adding 15 kcfs (283) and unit 11 is unknown at this time but it is expected to return by April as well adding another 15 kcfs for a total of 298 kcfs available through the Bonneville first and second powerhouses. Unit 10 will remain out of service through December 31, 2006. If flows exceed 398 kcfs (298 kcfs powerhouse plus 100 kcfs spill), spill levels will exceed the levels reported above.
  - Minimum Generation: 30 kcfs.
  - Minimum spill: 50 kcfs.

Summer Spill Operations July 1 through August 31, 2006: 75 Day / 120 kcfs night spill cap.

Changes in Operations for Research Purposes:

- Spill duration for testing: No summer test is planned at Bonneville Dam in 2006.

- Spill Patterns for summer operations: Fish passage spill patterns are provided in attachment 1 (Table, Bonn-1). For spill levels exceeding 100 kcfs, spill patterns described in the FPP will be used.

Juvenile Transportation Program Operations

As noted above, the Corps' proposed operations submitted to the Court in November 2005, assumed average runoff conditions. Based on collaborative discussion with the regional agencies and Tribes, the following describes the juvenile fish transportation program under all runoff conditions. The lower Snake River projects are described first followed by McNary project operations.

Lower Snake River Dams - Operation and Timing:

March 25 – April 19. The Corps plans to initiate transport of fish on April 20, 2006 unless flows are well below average. If the seasonal average flow is lower than 70 kcfs in the lower Snake

River, discussions with TMT will occur regarding the transportation of collected juvenile fish from March 25 to April 19. Spill will commence on April 3 at the Snake River projects as discussed above. During the March 25 through April 19 timeframe, the transport projects will operate according to the following criteria. These criteria are consistent with the FPP; however, if regional discussions conclude that transportation of collected juvenile fish should commence sooner because seasonal average flows are below 70 kcfs, such operation will be implemented.

a. Lower Granite: All ESBS's will be installed by March 25 and juvenile fish bypassed via normal separator operations and routed to the mid-river release outfall. All juvenile fish collected will be interrogated for PIT tags and normal 24-hour sampling for the Smolt Monitoring Program will take place.

b. Little Goose and Lower Monumental: All ESBS's and STS's will be installed by April 1 and juvenile fish bypassed will occur via the normal separator operations and fish will be routed to normal facility bypass outfalls. All juvenile fish will be interrogated for PIT tags and limited sampling may take place every 3 to 5 days to monitor fish condition.

April 20 – June 20: The collection of fish at lower Snake River projects for transportation will commence at 0700 hours on April 20. Barging of fish will begin on April 21 and collected juvenile fish will be barged from each facility on a daily or every-other-day basis (depending on the number of fish) throughout the spring. Transport operations will be carried out concurrent with spill operations at each project and in accordance with all of the relevant operating criteria in the Fish Passage Plan.

June 21 – August 15: Transportation of juvenile fish from all three Snake River transport projects will continue on an every-other-day basis from June 21 through August 15, via barges.

August 16 – August 31: After August 15, trucks will be used for transporting juvenile fish from the Snake River collector projects on an every-other-day basis through August 31.

September 1 – Completion: Transportation of juvenile fish via trucks on an every-other-day basis will continue through October 31 at Lower Granite and Little Goose dams. At Lower Monumental Dam, transportation of fish via every-other day trucking will continue through September 30, 2006.

McNary Dam - Operation and Timing:

Spring: Juvenile fish collected at McNary during the spring, April 1 through June 20, will be bypassed to the river. The normal operation will be to bypass fish through the full flow bypass pipe, which has interrogation capability to monitor for PIT tags. Every-other-day, however, in order to sample fish for the Smolt Monitoring Program, fish will be routed through the separator, interrogated for PIT tags, and then bypassed to the river.

Summer: When river conditions are determined to no longer be "spring like" as defined in the FPP and discussed at TMT, transportation of juvenile fish will begin. Collected juvenile fish

will be barged every-other-day through August 16 unless they have been marked for in-river passage research. From August 16 through September 30, transportation will occur via trucks.

Emergency Protocols

The Corps will operate the projects in accordance with the Water Management Plan Emergency Protocols. The Protocols define emergency conditions and situations that may arise, which affect the generation and delivery of energy produced by the Federal Columbia River Power System (FCRPS), and the immediate response that may be taken in the face of the emergency. The TMT is revising the Emergency Protocols. The most recent draft version (March 20, 2006) of the Water Management Plan Appendix 1 is located at: http://www.nwd-wc.usace.army.mil/tmt/documents/wmp/

Monthly Implementation Reporting

The Corps will submit monthly reports on the implementation of the 2006 fish passage operations as ordered by the Court. The monthly reports will include the following information:

- the hourly flow through the powerhouse;
- the hourly flow over the spillway compared to the spill target for that hour; and,
- the resultant 12-hour average TDG for the tailwater at each project and for the next project's forebay downstream.

The monthly report will also provide information on substantial issues that arise as a result of the spill program (e.g. Little Goose adult passage issue in 2005). The monthly report will also address any emergency situations that arise.

The Corps will continue to provide the following information regarding project flows, spill volumes, TDG levels and water temperature. This information is available to the public and can be accessed by the Court.

- Flow and spill quantity data for the lower Snake and Columbia River dams are posted to the following website every hour: http://www.nwd-wc.usace.army.mil/report/projdata.htm

- TDG and temperature water quality data are posted to the following website every six hours: http://www.nwd-wc.usace.army.mil/tmt/ This data is received via satellite from fixed monitoring sites along the Columbia and Snake rivers every six hours and is put on our website upon receipt. Using the hourly TDG reading for each station in the lower Snake and lower Columbia rivers, the Corps calculates the highest 12-hour average TDG for each station and this is reported at: http://www.nwd-wc.usace.army.mil/ftppub/water_quality/12hr/html/

ATTACHMENT 1
TO EXHIBIT A

Attachment 1

Lower Granite Spill Patterns:

Spring: Spill during the spring will be approximately 20 kcfs day and night in accordance with the spill patterns in Table LWG-9 in the Corps' Fish Passage Plan. While spill tests will be taking place during the spring, the two spill treatments will involve moving the Behavioral Guidance Device (BGS) in and out utilizing the same spill pattern. Spill that takes place before and after the spill test will be in accordance with Table LWG-9 in the Fish Passage Plan (included below).

Table LWG-9. Lower Granite spillway pattern for fish passage (with RSW operating at pool elevation 734).

Spill Bay								Total Stops	Total Spill
1	2	3	4	5	6	7	8		
3.5	0	1	0	1	1	1	1	8.5	15.2
3.5	0	1	1	1	1	1	1	9.5	16.9
3.5	1	1	1	1	1	1	1	10.5	18.6
3.5	1	1	2	1	1	1	1	11.5	20.4
3.5	1	1	2	1	1	1	2	12.5	22.2
3.5	1	1	2	2	1	1	2	13.5	24.0
3.5	1	1	2	2	2	1	2	14.5	25.8
3.5	1	2	2	2	2	1	2	15.5	27.7
3.5	2	2	2	2	2	1	2	16.5	29.5
3.5	2	2	2	2	2	2	2	17.5	31.3
3.5	2	2	3	2	2	2	2	18.5	36.6
3.5	2	2	3	3	2	2	2	19.5	35.0
3.5	2	2	3	3	3	2	2	20.5	36.9
3.5	2	3	3	3	3	2	2	21.5	38.7
3.5	3	3	3	3	3	2	2	22.5	40.6
3.5	3	3	4	3	3	2	2	23.5	42.4
3.5	3	3	4	4	3	2	2	24.5	44.3
3.5	3	3	4	4	4	2	2	25.5	46.2
3.5	3	4	4	4	4	2	2	26.5	48.0
3.5	4	4	4	4	4	2	2	27.5	49.9
3.5	4	4	4	4	4	2	3	28.5	51.7
3.5	4	4	4	4	4	3	3	29.5	53.6
3.5	4	4	5	4	4	3	3	30.5	55.5
3.5	4	4	5	5	4	3	3	31.5	57.3
3.5	4	4	5	5	5	3	3	32.5	59.2
3.5	4	5	5	5	5	3	3	33.5	61.0
3.5	5	5	5	5	5	3	3	34.5	62.9
3.5	5	5	5	5	5	3	4	35.5	64.8

3.5	5	5	5	5	5	4	4	36.5	66.6
3.5	5	5	6	5	5	4	4	37.5	68.5
3.5	5	5	6	6	5	4	4	38.5	70.3
3.5	5	5	6	6	6	4	4	39.5	72.2
3.5	5	6	6	6	6	4	4	40.5	74.1
3.5	6	6	6	6	6	4	4	41.5	75.9

Note: Minimum involuntary spill with RSW operating is 15.2 kcfs.
Note: At approximately 3.5 stops, the tainter gate no longer regulates flow through the RSW. The tainter gate should be raised at least 9 stops so the gate does not interfere with the spillbay flow.

Summer: During the summer spill test, the spill volume will be approximately 18 kcfs, the BGS will be in the upstream stored position, and two test spill pattern treatments will be used. One spill pattern that will be used is shown in line 3 in Table LWG-9 (shown above) and the other spill pattern is listed below (Table LWG-11). Spill before and after the test spill period will be in accordance with the spill pattern in Table LWG-9 in the Fish Passage Plan.

Table LWG-11. Summer alternative training spill pattern

Spill Bay								Total Stops	Total Spill
1	**2**	**3**	**4**	**5**	**6**	**7**	**8**		
3.5	0	4	0	0	1	1	1	10.5	19.0

Little Goose Spill Patterns:

Spring and Summer: Spill during the spring and summer will be for 30% of the river flow. Two spill patterns/treatments will be tested in both the spring and summer periods. Spill will be provided according to Table LGS-10 (shown below) outside of the spill test periods. During the spill tests, spill will be provided in accordance to spill patterns in Table LGS-10 and Table LGS-11 in an alternating study scenario.

Table LGS-10. Little Goose 2006 Test spill Pattern (based on pool elevation 634) for Modified Uniform Spill.

Spill Bay								Total Stops	Total Spill
1	**2**	**3**	**4**	**5**	**6**	**7**	**8**		
	3							3	5.68
	4							4	7.66
1	**4**							**5**	**9.43**
	3	3						6	11.36
1	3	3						7	13.13
	4	4						8	15.32
	3	3	3					9	17.04
1	**3**	**3**	**3**					**10**	**18.81**

1	3	3	3	1				11	20.58
	3	3	3	3				12	22.72
1	3	3	3	3				13	24.49
1	3	3	3	3	1			14	26.26
	3	**3**	**3**	**3**	**3**			**15**	**28.4**
1	3	3	3	3	3			16	30.17
1	3	3	3	3	3	1		17	31.94
	3	3	3	3	3	3		18	34.08
1	3	3	3	3	3	3		19	35.85
	4	**4**	**4**	**4**	**4**			**20**	**38.3**
1	4	4	4	4	4			21	40.07
1	4	4	4	4	4	1		22	41.84
	4	4	4	4	4	3		23	43.98
	4	4	4	4	4	4		24	45.96
1	**4**	**4**	**4**	**4**	**4**	**4**		**25**	**47.73**[1]
1	5	4	4	4	4	4		26	49.71
1	5	5	4	4	4	4		27	51.69
1	5	5	5	4	4	4		28	53.67
1	5	5	5	5	4	4		29	55.65
1	**5**	**5**	**5**	**5**	**5**	**4**		**30**	**57.63**
1	5	5	5	5	5	5		31	59.61
1	6	5	5	5	5	5		32	61.58
1	6	6	5	5	5	5		33	63.55
1	6	6	6	5	5	5		34	65.52
1	**6**	**6**	**6**	**6**	**5**	**5**		**35**	**67.49**
1	6	6	6	6	6	5		36	69.46
1	6	6	6	6	6	6		37	71.43
1	7	6	6	6	6	6		38	73.38

Table LGS-11. Little Goose 2006 Test spill Pattern (based on pool elevation 634) for Bulk Spill in Spillbay 2.

Spill Bay								Total Stops	Total Spill
1	**2**	**3**	**4**	**5**	**6**	**7**	**8**		
	3							3	5.68
	4							4	7.66
1	**4**							**5**	**9.43**
1	4	1						6	11.2
1	5	1						7	13.18
1	5	1	1					8	14.95

[1] At 25 stops and 30% spill (47.7 kcfs) powerhouse discharge is maximal (110 kcfs, within 1% range). 30% spill can therefore be maintained up to a maximum river discharge of about 158 kcfs; above this will be a higher % spill.

1	5	1	1	1				9	16.72
1	**5**	**2**	**1**	**1**				**10**	**18.63**
1	5	2	2	1				11	20.54
1	5	3	2	1				12	22.54
1	5	4	2	1				13	24.52
1	5	4	2	2				14	26.43
1	**5**	**4**	**2**	**2**	**1**			**15**	**28.2**
1	5	4	2	2	2			16	30.11
1	5	5	2	2	2			17	32.09
1	5	5	3	2	2			18	34.09
1	5	5	4	2	2			19	36.07
1	**5**	**5**	**4**	**2**	**2**	**1**		**20**	**37.84**
1	5	5	4	2	2	2		21	39.75
1	5	5	4	3	2	2		22	41.75
1	5	5	4	4	2	2		23	43.73
1	5	5	4	4	3	2		24	45.73
1	**5**	**5**	**4**	**4**	**4**	**2**		**25**	**47.71**[2]
1	5	4	4	4	4	4		26	49.71
1	5	5	4	4	4	4		27	51.69
1	5	5	5	4	4	4		28	53.67
1	5	5	5	5	4	4		29	55.65
1	**5**	**5**	**5**	**5**	**5**	**4**		**30**	**57.63**
1	5	5	5	5	5	5		31	59.61
1	6	5	5	5	5	5		32	61.58
1	6	6	5	5	5	5		33	63.55
1	6	6	6	5	5	5		34	65.52
1	**6**	**6**	**6**	**6**	**5**	**5**		**35**	**67.49**
1	6	6	6	6	6	5		36	69.46
1	6	6	6	6	6	6		37	71.43
1	7	6	6	6	6	6		38	73.38

Lower Monumental Spill Patterns:

Spring: Spill at Lower Monumental during the spring will be 40 kcfs 24 hours per day. Juvenile fish passage and survival will be evaluated; however, alternative patterns will not be tested. Spill during the spring will be provided in accordance with two spill patterns, a low river flow spill pattern (Table LMN-13, below) and a high river flow spill pattern (Table LMN-14, below). The purpose of the high river flow pattern is to provide as much spill as possible while

[2] At 25 stops and 30% spill (47.7 kcfs) powerhouse discharge is maximal (110 kcfs, within 1% range). 30% spill can therefore be maintained up to a maximum river discharge of about 158 kcfs; above this will be a higher % spill, and the pattern shifts to a uniform spill pattern.

minimizing total dissolved gas levels. The high river flow pattern was developed because spillway survival data from 2003 indicates that normal spillway gate openings do not have a passage problem at higher river flow/tailrace levels. The transition between the two patterns will be dependant on monitoring of dissolved gas levels in the river.

Table LMN-13. Lower Monumental Dam bulk spill pattern for river flows less than 120 kcfs (120 - 125 kcfs).

Spill Bay								Total Stops	Total Spill
1	**2**	**3**	**4**	**5**	**6**	**7**	**8**		
0	1	0	0	0	0	0	1	2	2.2
0	1	0	0	0	0	0	2	3	3.9
0	1	0	0	0	0	0	3	4	5.7
0	**1**	**0**	**0**	**0**	**0**	**0**	**4**	**5**	**7.3**
0	1	0	0	0	0	0	5	6	9.0
0	2	0	0	0	0	0	5	7	10.7
0	2	0	0	0	1	0	5	8	11.8
0	2	0	0	0	2	0	5	9	13.5
0	**2**	**0**	**0**	**0**	**3**	**0**	**5**	**10**	**15.3**
0	2	0	0	0	4	0	5	11	16.9
0	2	0	0	1	4	0	5	12	18.0
0	2	0	0	1	5	0	5	13	19.7
1	2	0	0	1	5	0	5	14	20.8
1	**1**	**1**	**1**	**1**	**5**	**0**	**5**	**15**	**21.3**
1	1	1	1	1	5	0	6	16	23.0
1	1	1	1	1	6	0	6	17	24.7
1	1	1	1	2	6	0	6	18	26.4
1	1	1	2	2	6	0	6	19	28.1
1	**1**	**1**	**2**	**5**	**5**	**0**	**5**	**20**	**29.8**
2	1	1	2	5	5	0	5	21	31.5
2	1	2	2	5	5	0	5	22	33.2
2	2	2	2	5	5	0	5	23	34.9
3	2	2	2	5	5	0	5	24	36.7
3	**3**	**2**	**2**	**5**	**5**	**0**	**5**	**25**	**38.5**
3	3	2	2	5	5	1	5	26	39.6
3	3	2	2	5	5	2	5	27	41.3
3	3	2	3	5	5	2	5	28	43.1
3	3	3	3	5	5	2	5	29	44.9
3	**3**	**3**	**3**	**5**	**5**	**2**	**6**	**30**	**46.6**
3	3	3	3	5	6	2	6	31	48.3
3	3	3	3	6	6	2	6	32	50.0
3	3	3	3	6	6	3	6	33	51.8
3	3	3	3	6	6	4	6	34	53.4
3	**3**	**3**	**3**	**6**	**6**	**5**	**6**	**35**	**55.1**

Spill Bay								Total Stops	Total Spill
1	**2**	**3**	**4**	**5**	**6**	**7**	**8**		
3	3	3	3	6	6	6	6	36	56.8
3	3	3	4	6	6	6	6	37	58.4
3	3	4	4	6	6	6	6	38	60.0
3	4	4	4	6	6	6	6	39	61.6
4	**4**	**4**	**4**	**6**	**6**	**6**	**6**	**40**	**63.2**

Table LMN-13. Lower Monumental Dam bulk spill pattern for river flows less than 120 kcfs (120 - 125 kcfs) (continued).

Spill Bay								Total Stops	Total Spill
1	**2**	**3**	**4**	**5**	**6**	**7**	**8**		
4	4	4	5	6	6	6	6	41	64.9
4	4	5	5	6	6	6	6	42	66.6
4	5	5	5	6	6	6	6	43	68.3
5	5	5	5	6	6	6	6	44	70.0
5	**5**	**5**	**6**	**6**	**6**	**6**	**6**	**45**	**71.7**
5	5	6	6	6	6	6	6	46	73.4
5	6	6	6	6	6	6	6	47	75.1
6	6	6	6	6	6	6	6	48	76.8
6	6	6	6	6	6	6	7	49	78.5
6	**6**	**6**	**6**	**6**	**6**	**7**	**7**	**50**	**80.2**
6	6	6	6	6	7	7	7	51	81.9
6	6	6	6	7	7	7	7	52	83.6
6	6	6	7	7	7	7	7	53	85.3
6	6	7	7	7	7	7	7	54	87.0
6	**7**	**7**	**7**	**7**	**7**	**7**	**7**	**55**	**88.7**
7	7	7	7	7	7	7	7	56	90.4
7	7	7	7	7	7	7	8	57	92.2
7	7	7	7	7	7	8	8	58	94.0
7	7	7	7	7	8	8	8	59	95.8
7	**7**	**7**	**7**	**8**	**8**	**8**	**8**	**60**	**97.6**
7	7	7	8	8	8	8	8	61	99.4
7	7	8	8	8	8	8	8	62	101.2
7	8	8	8	8	8	8	8	63	103.0
8	8	8	8	8	8	8	8	64	104.8
8	**8**	**8**	**8**	**8**	**8**	**8**	**9**	**65**	**106.5**
8	8	8	8	8	8	9	9	66	108.2
8	8	8	8	8	9	9	9	67	109.9
8	8	8	8	9	9	9	9	68	111.6
8	8	8	9	9	9	9	9	69	113.3
8	**8**	**9**	**9**	**9**	**9**	**9**	**9**	**70**	**115.0**
8	9	9	9	9	9	9	9	71	116.7

Spill Bay								Total Stops	Total Spill
1	**2**	**3**	**4**	**5**	**6**	**7**	**8**		
9	9	9	9	9	9	9	9	72	118.4
9	9	9	9	9	9	9	10	73	120.1

Table LMN-14. Lower Monumental Dam spill pattern <u>for river flows sustained above 120 kcfs (120 to 125 kcfs).</u>

Spill Bay								Total Stops	Total Spill
1	**2**	**3**	**4**	**5**	**6**	**7**	**8**		
0	0	0	0	0	0	0	1	1	1.1
1	0	0	0	0	0	0	1	2	2.2
1	0	0	0	0	0	1	1	3	3.3
1	1	0	0	0	0	1	1	4	4.4
1	**1**	**0**	**0**	**0**	**1**	**1**	**1**	**5**	**5.5**
1	1	1	0	0	1	1	1	6	6.6
1	1	1	0	1	1	1	1	7	7.7
1	1	1	1	1	1	1	1	8	8.8
1	1	1	1	1	1	1	2	9	10.5
1	**1**	**1**	**1**	**1**	**1**	**1**	**3**	**10**	**12.3**
1	1	1	1	1	1	1	4	11	13.9
1	1	1	1	1	1	1	5	12	15.6
1	1	1	1	1	1	2	5	13	17.3
1	1	1	1	1	2	2	5	14	19.0
1	**1**	**1**	**1**	**2**	**2**	**2**	**5**	**15**	**20.7**
1	1	1	2	2	2	2	5	16	22.4
1	1	2	2	2	2	2	5	17	24.1
1	2	2	2	2	2	2	5	18	25.8
2	2	2	2	2	2	2	5	19	27.5
2	**2**	**2**	**2**	**2**	**2**	**3**	**5**	**20**	**29.3**
2	2	2	2	2	3	3	5	21	31.1
2	2	2	2	3	3	3	5	22	32.9
2	2	2	3	3	3	3	5	23	34.7
2	2	3	3	3	3	3	5	24	36.5
2	**3**	**3**	**3**	**3**	**3**	**3**	**5**	**25**	**38.3**
3	3	3	3	3	3	3	5	26	40.1
3	3	3	3	3	3	4	5	27	41.7
3	3	3	3	3	4	4	5	28	43.3
3	3	3	3	4	4	4	5	29	44.9
3	**3**	**3**	**4**	**4**	**4**	**4**	**5**	**30**	**46.5**
3	3	4	4	4	4	4	5	31	48.1
3	4	4	4	4	4	4	5	32	49.7
4	4	4	4	4	4	4	5	33	51.3

Spill Bay								Total Stops	Total Spill
1	**2**	**3**	**4**	**5**	**6**	**7**	**8**		
4	4	4	4	4	4	5	5	34	53.0
4	**4**	**4**	**4**	**4**	**5**	**5**	**5**	**35**	**54.7**
4	4	4	4	5	5	5	5	36	56.4
4	4	4	5	5	5	5	5	37	58.1
4	4	5	5	5	5	5	5	38	59.8
4	5	5	5	5	5	5	5	39	61.5

Table LMN-14. Lower Monumental Dam spill pattern <u>for river flows sustained above 120 kcfs (120 to 125 kcfs)</u> (continued).

Spill Bay								Total Stops	Total Spill
1	**2**	**3**	**4**	**5**	**6**	**7**	**8**		
5	**5**	**5**	**5**	**5**	**5**	**5**	**5**	**40**	**63.2**
5	5	5	5	5	5	5	6	41	64.9
5	5	5	5	5	5	6	6	42	66.6
5	5	5	5	5	6	6	6	43	68.3
5	5	5	5	6	6	6	6	44	70.0
5	**5**	**5**	**6**	**6**	**6**	**6**	**6**	**45**	**71.7**
5	5	6	6	6	6	6	6	46	73.4
5	6	6	6	6	6	6	6	47	75.1
6	6	6	6	6	6	6	6	48	76.8
6	6	6	6	6	6	6	7	49	78.5
6	**6**	**6**	**6**	**6**	**6**	**7**	**7**	**50**	**80.2**
6	6	6	6	6	7	7	7	51	81.9
6	6	6	6	7	7	7	7	52	83.6
6	6	6	7	7	7	7	7	53	85.3
6	6	7	7	7	7	7	7	54	87.0
6	**7**	**7**	**7**	**7**	**7**	**7**	**7**	**55**	**88.7**
7	7	7	7	7	7	7	7	56	90.4
7	7	7	7	7	7	7	8	57	92.2
7	7	7	7	7	7	8	8	58	94.0
7	7	7	7	7	8	8	8	59	95.8
7	**7**	**7**	**7**	**8**	**8**	**8**	**8**	**60**	**97.6**
7	7	7	8	8	8	8	8	61	99.4
7	7	8	8	8	8	8	8	62	101.2
7	8	8	8	8	8	8	8	63	103.0
8	8	8	8	8	8	8	8	64	104.8
8	**8**	**8**	**8**	**8**	**8**	**8**	**9**	**65**	**106.5**
8	8	8	8	8	8	9	9	66	108.2
8	8	8	8	8	9	9	9	67	109.9
8	8	8	8	9	9	9	9	68	111.6

Spill Bay								Total Stops	Total Spill
1	**2**	**3**	**4**	**5**	**6**	**7**	**8**		
8	8	8	9	9	9	9	9	69	113.3
8	**8**	**9**	**9**	**9**	**9**	**9**	**9**	**70**	**115.0**
8	9	9	9	9	9	9	9	71	116.7
9	9	9	9	9	9	9	9	72	118.4
9	9	9	9	9	9	9	10	73	120.1
9	9	9	9	9	9	10	10	74	121.8
9	**9**	**9**	**9**	**9**	**10**	**10**	**10**	**75**	**123.5**
9	9	9	9	10	10	10	10	76	125.2
9	9	9	10	10	10	10	10	77	126.9
9	9	10	10	10	10	10	10	78	128.6

Table LMN-14. Lower Monumental Dam spill pattern <u>for river flows sustained above 120 kcfs (120 to 125 kcfs)</u> (continued).

Spill Bay								Total Stops	Total Spill
1	**2**	**3**	**4**	**5**	**6**	**7**	**8**		
9	10	10	10	10	10	10	10	79	130.3
10	**10**	**10**	**10**	**10**	**10**	**10**	**10**	**80**	**132.0**
10	10	10	10	10	10	10	11	81	133.7
10	10	10	10	10	10	11	11	82	135.4
10	10	10	10	10	11	11	11	83	137.1
10	10	10	10	11	11	11	11	84	138.8
10	**10**	**10**	**11**	**11**	**11**	**11**	**11**	**85**	**140.5**
10	10	11	11	11	11	11	11	86	142.2
10	11	11	11	11	11	11	11	87	143.9
11	11	11	11	11	11	11	11	88	145.6
11	11	11	11	11	11	11	12	89	147.4
11	**11**	**11**	**11**	**11**	**11**	**12**	**12**	**90**	**149.2**
11	11	11	11	11	12	12	12	91	151.0
11	11	11	11	12	12	12	12	92	152.8
11	11	11	12	12	12	12	12	93	154.6
11	11	12	12	12	12	12	12	94	156.4
11	**12**	**12**	**12**	**12**	**12**	**12**	**12**	**95**	**158.2**
12	12	12	12	12	12	12	12	96	160.0
12	12	12	12	12	12	12	13	97	161.7
12	12	12	12	12	12	13	13	98	163.4
12	12	12	12	12	13	13	13	99	165.1
12	**12**	**12**	**12**	**13**	**13**	**13**	**13**	**100**	**166.8**
12	12	12	13	13	13	13	13	101	168.5
12	12	13	13	13	13	13	13	102	170.2
12	13	13	13	13	13	13	13	103	171.9

Spill Bay								Total Stops	Total Spill
1	**2**	**3**	**4**	**5**	**6**	**7**	**8**		
13	13	13	13	13	13	13	13	104	173.6
13	**13**	**13**	**13**	**13**	**13**	**13**	**14**	**105**	**175.3**
13	13	13	13	13	13	14	14	106	177.0
13	13	13	13	13	14	14	14	107	178.7
13	13	13	13	14	14	14	14	108	180.4
13	13	13	14	14	14	14	14	109	182.1
13	**13**	**14**	**14**	**14**	**14**	**14**	**14**	**110**	**183.8**
13	14	14	14	14	14	14	14	111	185.5
14	14	14	14	14	14	14	14	112	187.2
14	14	14	14	14	14	14	15	113	189.0
14	14	14	14	14	14	15	15	114	190.8
14	**14**	**14**	**14**	**14**	**15**	**15**	**15**	**115**	**192.6**
14	14	14	14	15	15	15	15	116	194.4
14	14	14	15	15	15	15	15	117	196.2

Table LMN-14. Lower Monumental Dam spill pattern <u>for river flows sustained above 120 kcfs (120 to 125 kcfs)</u> (continued).

Spill Bay								Total Stops	Total Spill
1	**2**	**3**	**4**	**5**	**6**	**7**	**8**		
14	14	15	15	15	15	15	15	118	198.0
14	15	15	15	15	15	15	15	119	199.8
15	**15**	**15**	**15**	**15**	**15**	**15**	**15**	**120**	**201.6**

Summer: Spill at Lower Monumental during the summer will be 18 kcfs 24-hours per day. Spill will be provided in accordance to the spill pattern in Table LMN-13, above.

Ice Harbor Spill Patterns:

Spring: Two test spill treatments utilizing the RSW will be tested at Ice Harbor during the spring. One treatment is for 30% spill 24-hours per day (Table IHR-10, below) and the other test treatment is 45 kcfs daytime spill with spill to the total dissolved gas cap at night (Table IHR-11, below). Before and after the spring test, spill will be provided at the 45kcfs daytime/gas cap night spill levels in accordance with the spill pattern in Table IHR-11.

Table IHR-10. Ice Harbor RSW 30% spill pattern.

Spill Bay												
1	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**Total Stops**	**Total Spill (kcfs)**	**Total River (kcfs)**
0	rsw	0	0	0	0	0	0	0	0	0	8.4	28.0
0	rsw	0	0	0	0	0	0	0	1	1	10.1	33.7
0	rsw	0	0	0	0	0	0	1	1	2	11.8	39.4
0	rsw	0	0	0	0	0	1	1	1	3	13.5	45.1
0	rsw	0	0	0	0	1	1	1	1	4	15.2	50.8
0	**rsw**	**0**	**0**	**0**	**1**	**1**	**1**	**1**	**1**	**5**	**17.0**	**56.5**
0	rsw	5	0	0	0	0	0	0	1	6	18.6	61.8
0	rsw	5	0	0	0	0	0	1	1	7	20.3	67.5
0	rsw	5	0	0	0	0	1	1	1	8	22.0	73.2
0	rsw	5	0	0	0	1	1	1	1	9	23.7	78.9
0	**rsw**	**5**	**0**	**0**	**1**	**1**	**1**	**1**	**1**	**10**	**25.4**	**84.6**
0	rsw	5	0	5	0	0	0	0	1	11	27.0	90.0
0	rsw	5	0	5	0	0	0	1	1	12	28.7	95.7
0	rsw	5	0	5	0	0	1	1	1	13	30.4	101.4
0	rsw	5	0	5	0	0	1	1	2	14	32.1	107.0
0	**rsw**	**5**	**0**	**5**	**0**	**0**	**1**	**2**	**2**	**15**	**33.8**	**112.7**
0	rsw	5	0	5	0	0	2	2	2	16	35.5	118.4
0	rsw	6	0	5	0	0	2	2	2	17	37.2	123.9
0	rsw	6	0	6	0	0	2	2	2	18	38.8	129.4
0	rsw	6	0	6	0	1	2	2	2	19	40.5	135.1
0	**rsw**	**6**	**0**	**6**	**0**	**2**	**2**	**2**	**2**	**20**	**42.2**	**140.8**
0	rsw	5	0	5	0	5	2	2	2	21	44.0	146.5
0	rsw	5	0	5	0	6	2	2	2	22	45.6	152.0
0	rsw	5	0	6	0	6	2	2	2	23	47.3	157.6
0	rsw	6	0	6	0	6	2	2	2	24	48.9	163.1
0	**rsw**	**6**	**0**	**6**	**0**	**6**	**2**	**3**	**2**	**25**	**50.6**	**168.7**
0	rsw	6	0	6	0	6	2	4	2	26	52.3	174.3
0	rsw	6	0	6	0	6	2	5	2	27	54.0	179.9
0	rsw	6	0	6	0	6	2	6	2	28	55.6	185.4
0	rsw	6	0	6	1	6	2	6	2	29	57.3	191.1
0	**rsw**	**6**	**0**	**6**	**2**	**6**	**2**	**6**	**2**	**30**	**59.0**	**196.8**
0	rsw	6	0	6	3	6	2	6	2	31	60.7	202.4
0	rsw	6	0	6	4	6	2	6	2	32	62.4	208.0
0	rsw	6	0	6	5	6	2	6	2	33	64.1	213.5
0	rsw	6	0	6	6	6	2	6	2	34	65.7	219.1

Note: The normal minimum spill level is 15.2 kcfs.

Table IHR-11. Ice Harbor RSW 45 kcfs/Spill Cap spill pattern.

Spill Bay											
1	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**Total Stops**	**Total Spill (kcfs)**
0	rsw	0	0	0	0	0	0	0	0	0	8.4
0	rsw	0	0	0	0	0	0	0	1	1	10.1
0	rsw	0	0	0	0	0	0	1	1	2	11.8
0	rsw	0	0	0	0	0	1	1	1	3	13.5
0	rsw	0	0	0	0	1	1	1	1	4	15.2
0	**rsw**	**0**	**0**	**0**	**1**	**1**	**1**	**1**	**1**	**5**	**17.0**
0	rsw	0	5	0	0	0	0	0	1	6	18.6
0	rsw	0	5	0	0	0	0	1	1	7	20.3
0	rsw	0	5	0	0	0	1	1	1	8	22.0
0	rsw	0	5	0	0	1	1	1	1	9	23.7
0	**rsw**	**0**	**5**	**0**	**5**	**0**	**0**	**0**	**0**	**10**	**25.3**
0	rsw	0	5	0	5	0	0	0	1	11	27.0
0	rsw	0	5	0	5	0	0	1	1	12	28.7
0	rsw	0	5	0	5	0	1	1	1	13	30.4
0	rsw	0	5	0	5	1	1	1	1	14	32.1
0	**rsw**	**0**	**5**	**0**	**5**	**1**	**1**	**1**	**2**	**15**	**33.8**
0	rsw	0	5	0	5	1	1	2	2	16	35.5
0	rsw	0	5	0	5	1	2	2	2	17	37.2
0	rsw	0	5	0	5	2	2	2	2	18	38.9
0	rsw	0	5	0	5	2	2	2	3	19	40.6
0	**rsw**	**0**	**5**	**0**	**5**	**2**	**2**	**3**	**3**	**20**	**42.3**
0	rsw	0	5	0	5	5	2	2	2	21	44.0
0	rsw	0	6	0	5	5	2	2	2	22	45.6
0	rsw	0	6	0	6	5	2	2	2	23	47.3
0	rsw	0	6	0	6	6	2	2	2	24	48.9
0	**rsw**	**0**	**6**	**5**	**5**	**5**	**1**	**1**	**2**	**25**	**50.7**
0	rsw	0	6	5	5	5	1	2	2	26	52.4
0	rsw	0	6	5	5	5	2	2	2	27	54.1
0	rsw	0	6	6	5	5	2	2	2	28	55.7
0	rsw	0	6	6	5	5	2	3	2	29	57.4
0	**rsw**	**0**	**6**	**6**	**5**	**5**	**2**	**4**	**2**	**30**	**59.1**
0	rsw	0	6	6	5	5	2	5	2	31	60.7
0	rsw	0	6	6	5	5	3	5	2	32	62.4
0	rsw	0	6	6	5	5	4	5	2	33	64.1
0	rsw	0	6	6	5	5	5	5	2	34	65.8
0	**rsw**	**1**	**6**	**6**	**5**	**5**	**5**	**5**	**2**	**35**	**67.5**
0	rsw	2	6	6	5	5	5	5	2	36	69.2
0	rsw	3	6	6	5	5	5	5	2	37	70.9
0	rsw	4	6	6	5	5	5	5	2	38	72.6
0	rsw	5	6	6	5	5	5	5	2	39	74.2
0	**rsw**	**6**	**6**	**6**	**5**	**5**	**5**	**5**	**2**	**40**	**75.9**

Note: The normal minimum spill level is 15.2 kcfs.

Table IHR-11. Ice Harbor RSW 45 kcfs/Spill Cap spill pattern (continued).

Spill Bay											
1	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**Total Stops**	**Total Spill (kcfs)**
0	rsw	6	6	6	6	5	5	5	2	41	77.5
0	rsw	6	6	6	6	6	5	5	2	42	79.2
0	rsw	6	6	6	6	6	6	5	2	43	80.9
0	rsw	6	6	6	6	6	6	6	2	44	82.5
0	**rsw**	**7**	**6**	**6**	**6**	**6**	**6**	**6**	**2**	**45**	**84.1**
0	rsw	7	7	6	6	6	6	6	2	46	85.7
0	rsw	7	7	7	6	6	6	6	2	47	87.3
0	rsw	7	7	7	7	6	6	6	2	48	88.9
0	rsw	7	7	7	7	7	6	6	2	49	90.5
0	**rsw**	**7**	**7**	**7**	**7**	**7**	**7**	**6**	**2**	**50**	**92.1**
0	rsw	7	7	7	7	7	7	7	2	51	93.7
0	rsw	8	7	7	7	7	7	7	2	52	95.3
0	rsw	8	8	7	7	7	7	7	2	53	96.9
0	rsw	8	8	8	7	7	7	7	2	54	98.5
0	**rsw**	**8**	**8**	**8**	**8**	**7**	**7**	**7**	**2**	**55**	**100.1**
0	rsw	8	8	8	8	8	7	7	2	56	101.7
0	rsw	8	8	8	8	8	8	7	2	57	103.3
0	rsw	8	8	8	8	8	8	8	2	58	104.9
0	rsw	9	8	8	8	8	8	8	2	59	106.6
0	**rsw**	**9**	**9**	**8**	**8**	**8**	**8**	**8**	**2**	**60**	**108.3**
0	rsw	9	9	9	8	8	8	8	2	61	110.0
0	rsw	9	9	9	9	8	8	8	2	62	111.7
0	rsw	9	9	9	9	9	8	8	2	63	113.4

Summer: The same two spill test treatments and spill patterns will be tested during the summer period. Before and after the test period, spill will be provided utilizing the pattern in Table IHR-11, above.

McNary Spill Patterns:

Spring: Spill tests will be conducting during the spring comparing no daytime spill/gas cap spill at night to 40% spill 24-hours per day. This Attachment will be supplemented once those patterns are obtained. Spill patterns for this study will be developed at ERDC during the week of March 27. Before and after the spring testing, spill will be provided in accordance with the spill pattern in Table MCN-6 in the Fish Passage Plan.

Summer: Spill tests will be conducted during the summer utilizing spill patterns developed at ERDC during the week of March 27. This Attachment will be supplemented once those patterns are obtained. Summer spill will compare two test treatments of 40% 24-hour per day spill to 60% 24-hour per day spill. Before and after the summer spill testing, spill will be provided in accordance with the spill pattern in Table MCN-6 in the Fish Passage Plan.

Bonneville Spill Patterns:

New spill patterns were developed for spill flows less than 100 kcfs. These will primarily be used for summer conditions during the day when spill flows are at 75 kcfs. However, this could also occur as a result of exceeding the TDG limits at 100 kcfs spill. Spill patterns for spill above 100 kcfs are outlined in the FPP.

Table Bonn-1

TW El	Spill kcfs	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	Total Gate Opening	Total Spill
10	50	2.0	2.0	2.0	2.0	0.0	2.0	0.0	2.0	0.0	2.0	0.0	2.0	0.0	2.0	0.0	2.0	2.0	3.0	25.0	50
15	50	2.0	2.0	2.0	2.0	0.0	2.0	0.0	2.0	0.0	2.0	0.0	2.0	0.0	2.0	0.0	2.0	2.0	3.0	25.0	50
18	**50**	3.0	2.0	2.0	2.0	0.0	2.0	0.0	2.0	0.0	0.0	2.0	0.0	0.0	2.0	0.0	2.5	2.5	3.0	25.0	50
20	50	3.0	2.0	2.0	2.0	0.0	2.0	0.0	2.0	0.0	0.0	2.0	0.0	0.0	2.0	0.0	2.5	2.5	3.0	25.0	50
10	75	3.0	3.0	2.5	2.0	2.0	2.0	2.0	2.0	2.0	0.0	2.0	0.0	2.0	2.0	2.0	3.0	3.5	2.0	37.0	75
15	75	3.0	3.0	2.5	2.0	2.0	2.0	2.0	2.0	2.0	0.0	2.0	0.0	2.0	2.0	2.0	3.0	3.5	2.0	37.0	75
20	75	3.0	3.0	2.5	2.0	2.0	2.0	2.0	2.0	2.0	0.0	2.0	0.0	2.0	2.0	2.0	3.0	3.5	2.0	37.0	75
10	80	3.5	3.0	2.0	2.0	2.5	2.0	2.0	2.0	2.0	2.0	2.0	0.0	2.0	2.0	2.0	2.5	3.0	3.5	40.0	80
15	80	3.5	3.0	2.0	2.0	2.5	2.0	2.0	2.0	2.0	2.0	2.0	0.0	2.0	2.0	2.0	2.5	3.0	3.5	40.0	80
16	**80**	5.0	3.0	2.0	2.0	2.5	2.0	2.0	2.0	2.0	0.0	2.0	0.0	2.0	2.0	2.0	2.5	3.0	4.5	40.5	80
20	80	5.0	3.0	2.0	2.0	2.5	2.0	2.0	2.0	2.0	0.0	2.0	0.0	2.0	2.0	2.0	2.5	3.0	4.5	40.5	80
25	80	5.0	3.0	2.0	2.0	2.5	2.0	2.0	2.0	2.0	0.0	2.0	0.0	2.0	2.0	2.0	2.5	3.0	4.5	40.5	80
10	90	3.0	3.5	3.0	2.5	2.5	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.5	2.5	3.0	3.5	3.0	45.0	90
15	90	3.0	3.5	3.0	2.5	2.5	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.5	2.5	3.0	3.5	3.0	45.0	90
20	90	3.0	3.5	3.0	2.5	2.5	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.5	2.5	3.0	3.5	3.0	45.0	90
22	90	3.0	3.5	3.0	2.5	2.5	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.5	2.5	3.0	3.5	3.0	45.0	90
23	**90**	4.5	3.0	3.0	2.5	2.0	2.0	2.0	2.0	2.0	2.0	2.0	0.0	2.0	2.5	2.0	3.0	3.5	4.5	44.5	90

25	90	4.5	3.0	3.0	2.5	2.0	2.0	2.0	2.0	2.0	2.0	2.0	0.0	2.0	2.5	2.0	3.0	3.5	4.5	44.5	90
15	100	3.0	3.5	3.0	3.0	3.0	2.5	2.5	2.5	2.0	2.5	2.0	2.5	2.5	2.5	3.0	3.5	3.5	3.0	50.0	100
20	100	3.0	3.5	3.0	3.0	3.0	2.5	2.5	2.5	2.0	2.5	2.0	2.5	2.5	2.5	3.0	3.5	3.5	3.0	50.0	100
20	**100**	4.0	3.5	3.0	3.0	3.0	2.5	2.0	2.0	2.0	2.0	2.0	2.0	2.5	2.5	3.0	3.5	3.5	4.0	50.0	100
25	100	4.0	3.5	3.0	3.0	3.0	2.5	2.0	2.0	2.0	2.0	2.0	2.0	2.5	2.5	3.0	3.5	3.5	4.0	50.0	100